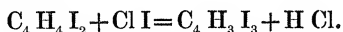


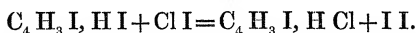
of iodine, expecting that the teriodide would be formed by virtue of the following reaction :—



My expectations, however, were not realized, the product of the reaction being a body which I shall call chloriodide of ethylene ( $\text{C}_4 \text{H}_4 \text{I Cl}$ ). The experiment was performed in the following manner :—

*Action of Chloride of Iodine on Iodide of Ethylene.*—A solution of chloride of iodine in water containing a trace of free iodine was agitated vigorously with a quantity of iodide of ethylene, till the latter became black and changed into a fluid oil. This was then washed with dilute potash and distilled. Almost the entire liquid passed over between  $146^\circ$  and  $152^\circ$  Cent. It gave, on analysis, results which correspond perfectly with the formula I have given above. I obtained 12.43 instead of 12.55 per cent. of carbon.

If we regard the constitution of iodide of ethylene as  $\text{C}_4 \text{H}_3 \text{I}$ ,  $\text{HI}$ , the reaction which gives birth to this body becomes perfectly intelligible. It is simply the substitution of chlorine for iodine in hydriodic acid :—



Chloriodide of ethylidene is a colourless oil. It has a sweet taste, and is slightly soluble in water. It boils at about  $147^\circ$  Cent. It is a remarkable fact that neither this body nor Dutch liquid is formed when iodide of ethylene is exposed to the action of chlorine-water.

I have also subjected propylene gas, derived from amylic alcohol, to the action of chloride of iodine, and find that an oily body is formed in large quantity, which contains iodine. This I am at present engaged in studying. The action of chloride of iodine on propylene gas obtained from glycerine appears to be similar.

Letter to the Council from Sir George Everest, C.B., On the Expediency of re-examining the Southern Portion of the Great Indian Arc of the Meridian ; and Report of a Committee thereupon.

[Towards the close of the last session of the Royal Society a letter was addressed to the President and Council by Colonel Sir George Everest, C.B., advocating the expediency of re-examining the portion of the Great Indian Arc of Meridian which was surveyed by the

late Colonel Lambton, and collecting in one volume the results of that part of the survey. The Council, having taken this letter into consideration, appointed a committee, consisting of the Astronomer-Royal, Professor W. H. Miller, and Professor Stokes, to consider and report on the subject. The report was laid before the President and Council early in the present session; and by their direction the letter of Sir George Everest and the report of the Committee are here printed.]

*Letter of Colonel Sir George Everest, C.B.*

10 Westbourne Street, Hyde Park, W.  
April 8th, 1861.

SIR,—In a letter which I took occasion to address to you some time back \*, some remarks are made to which I am desirous to draw the attention of the President and gentlemen of the Council of the Royal Society. They are contained in page 7 of the printed copy of that letter; and as they relate to a subject of considerable importance in the estimation of myself and many others, I hope no apology will be necessary for the present intrusion.

To enter into a long narrative of my reasons for the statements therein made would but be to repeat what I have frequently urged on other occasions; but in this place it will perhaps be sufficient to mention that, 1st, the details of such portions of the late Colonel Lambton's operations on the Great Arc of India to the south of Damargida, as have been printed, are only to be found in a dispersed state in the volumes of the Asiatic Researches of Calcutta; and if it is intended that these should be permanent data, they ought to be collated and combined into one volume, in keeping with that relating to the portion north of Damargida, which was printed by me in 1847, at the expense and by the desire of the late East India Company.

2nd. The details of all trigonometrical operations conducted by Colonel Lambton are to be found in manuscript, in the copies of what are denominated the General Reports of the Great Trigonometrical Survey of India, which are deposited amongst the records at the India House; and as, in transcribing, there is always a liability to clerical errors, therefore a volume such as is here suggested ought to be drawn up after a rigorous comparison with the manuscript; and further, wherever it may be practicable, the observations

\* Proceedings of the R. S., Jan. 27, 1859.

registered in the General Reports should be compared with those originally noted in the Field- or, as they are called, Angle-Books of the department.

3rd. There certainly has been one error, if not more than one, committed in the computations ; but where such error or errors exist it is impossible to say *à priori* : the only decisive mode of detection must consist in a thorough recomputation.

4th. All the celestial observations for amplitude made by Colonel Lambton were reduced many years ago ; but I need hardly point out that the constants and formulæ for aberration, precession, nutation, &c., have undergone vast alterations since that period, and of course corresponding recomputations would now be necessary. This would not have been needed if the observations at each limit of the Arc of Amplitude had been made simultaneously by two instruments on the same set of stars, one instrument at each limit, as has been done in the two Arcs north of Damargida ; but it becomes of importance when not only the years, but the seasons of observations were different.

If this were effected, we should at least have the satisfaction of knowing that the most had been made of the late Colonel Lambton's operations, which indeed might fairly rank with those of MM. Bouguer and De la Condamine, or MM. Maupertius, Clairaut, and others, though, from the inferiority of instruments and other causes, of course they could not be classed for accuracy with those of a more modern date.

In proper time and place I have abundance to say on this subject ; but it will be evident that the revision and recomputation here suggested constitute a task beyond the power of any individual, and are indeed a state affair, which, now that India and all belonging to it has been taken under the control of Her Majesty's Government, can only be accomplished as other state concerns usually are.

What, therefore, I venture to recommend is, that the President and gentlemen of the Council of the Royal Society should take this subject into their consideration, as a national question falling peculiarly under their superintendence, and that in their capacity as the parent Society and leading scientific body of Great Britain, they should use their influence to have such measures effected as in their judgment may seem meet.

Perhaps a recommendation from the Royal Society to the Secretary

of State for India would be the proper course to be pursued ; but in any case it seems very clear that it is not creditable to leave this subject in its present disjointed state. India furnishes the largest extent of territory accessible to Great Britain in which arcs of the meridian can be measured, and there can be no question that from Cape Comorin to the Himalayan Mountains one uniform triangulation ought to be formed.

The most effectual method of accomplishing this desirable purpose would assuredly have been that which I counselled the Government of India to adopt in 1842 ; but as my proposal was rejected, it only remains to make the most of the materials we actually possess.

As to now giving effect to my proposal, which was to revise the whole series south of Damargida with the same instruments and observers as had been employed in the northern portion, there would be difficulties which did not then exist. Not to speak of the fact that there are none of the observers of that day at present available, it must be remembered that the station-marks of the Bedu base and the Damargida Observatory were then fresh and intact, as were indeed the other station-marks in general ; but the natives of India have a habit peculiar to human beings in that state of society, of attributing supernatural and miraculous powers to our instruments, and the sites which have been occupied by them. In cases of death or any other natural visitations they often offer up prayers to those sites ; and if the object of their prayers be not conceded, they proceed to all sorts of acts of destruction and indignity towards them : nay, as in all cases where it was practicable, my station-marks were engraved on the solid rock *in situ*, they have been known to proceed in bodies armed with sledge-hammers, and beat out every vestige of the engraving ; so that it is by no means certain that the marks which designate the limits at Damargida and Bedu could now be detected.

I will not trouble you with any further remarks, but, with full confidence that the Royal Society will, after giving the subject due consideration, take such measures as the case may seem in their wisdom to require,

I beg to subscribe myself, Sir,

Your very obedient Servant,

GEORGE EVEREST.

*To the Secretary of the Royal Society.*

*Report of the Committee.*

The Committee to whom it was referred by Minute of the President and Council of the Royal Society of the date of June 13, 1861, to consider and report on a letter by Colonel Sir George Everest, C.B., dated April 8, 1861, relating to the steps proper now to be taken in reference to Colonel Lambton's Survey of an Arc of Meridian in India, and on the subjects therewith connected, have to offer the following Report:—

1. The Committee have examined the principal printed books on the subject, namely,

The several volumes of the Asiatic Transactions, containing the details, to the extent to which in works of similar character they are usually published, of Colonel Lambton's Surveys.

The recalculation of the celestial amplitudes by Bessel in No. 334 of the 'Astronomische Nachrichten.'

The two printed volumes by Sir George Everest, containing the details of his own Indian Survey with much information on Colonel Lambton's Survey.

A former letter addressed by Sir George Everest to the Secretary, and printed in the 'Proceedings of the Royal Society' for January 27, 1859 (vol. ix. pp. 620–625).

The Committee have also been favoured by Sir George Everest, at a personal interview which that gentleman at their request most kindly granted them, with very important oral information on the instruments, the methods of proceeding, and other particulars relating to Colonel Lambton's and to his own survey; and they have been permitted by him to peruse a most valuable document, partly of private and partly of semi-official character, addressed to him by Mr. De Penning, formerly Chief Assistant to Colonel Lambton in the conduct of the Survey.

2. The Committee will first advert to the observations and primary deductions from them (of the nature of adopted angles, &c.) in Colonel Lambton's surveys. And in regard to these, they have no hesitation in stating their opinion that no good whatever would be done by general examination of the angle-books. It is evident from Mr. De Penning's statements that the utmost care was used, and the best judgment of the Officers was exercised, at a time when all the

qualifying circumstances of the separate observations were known to them, and that any attempt to depart from their conclusions at the present time would probably lead to error.

The Committee remark that the exhibition (in the Asiatic Researches) of the adopted angles with the corrections required to make the sum of the angles in each triangle equal to two right angles, renders it impossible that any clerical or typographical error can escape discovery: if any such should be found, of which the proper correction is not obvious and certain, they think it proper that reference should be made to the manuscripts now preserved in the Archives of the Department of State for India; but they recommend nothing further.

3. In regard to the accuracy of the calculations of the sides of the triangles, founded on the adopted angles to which allusion is made above, there appears to be no check except the verifications by the measure of widely-separated bases; and the comparison of these, as presented in the Asiatic Researches, shows a degree of accordance which the Committee, guided by the results of Sir George Everest's experience, consider satisfactory. Still they remark that the form in which these calculations are printed makes their verification extremely easy, and the Committee recommend that they be verified. Of the next step of calculation, namely the computation and aggregation of successive portions of the meridian (including the astronomical determinations of azimuth), there appears to be no check whatever; and the Committee recommend that this important calculation be repeated, and in a different form, if the officer entrusted with such revision should think it desirable.

4. The details of the base-measure reductions, as founded on Colonel Lambton's statements of the measuring process, admit of easy verification; and the Committee recommend that they be verified. But the evaluation of all these measures, for application to the estimate of the length of Arc of Meridian at the level of the sea, requires that the elevation of the bases be very approximately known. The portions of the Arc surveyed respectively by Colonel Lambton and Sir George Everest, join each other at Damargida; and there is a large discordance between the elevation of this station, as given first by Colonel Lambton, and secondly by Sir George Everest and Sir A. Waugh. Guided by the information which Sir George Everest

has furnished, on the inadequacy of the vertical circles of the instruments employed by Colonel Lambton, on the want of attention to atmospheric circumstances, and on the want of simultaneity in reciprocal observations (all which considerations have been carefully kept in view in Sir George Everest's and Sir A. Waugh's observations), the Committee recommend that Colonel Lambton's determinations of height of base be rejected, and those of Sir George Everest and Sir A. Waugh be adopted; and that the resulting corrections be made to the estimated lengths of Meridian Arcs, as far as, in the judgment of the Officer revising this work, it is now possible to do it.

5. The reductions of astronomical observations for celestial amplitude of arcs and absolute determination of latitude admit of easy examination; and the Committee recommend that they be thoroughly verified. The Committee recommend that the original numbers of these observations, as well as those of celestial azimuths, be verified by collation with any manuscripts of the Survey which may now be preserved in England.

6. The reduction of the Latitude-observations was corrected several years ago by Bessel. The Committee are of opinion that additional accuracy can now be given to these corrections. First, the proper motions of the stars are now better known than they were in Bessel's time. Secondly, the value of the coefficient of Nutation used by Bessel is now universally abandoned by astronomers. The alteration made in the result by the use of corrected values of these elements would probably be small; but, remarking that they can be introduced with great facility, the Committee recommend that the corrections be made.

7. The Committee have had personal experience of the great inconvenience caused by the dispersion of Colonel Lambton's accounts of the survey-operations through numerous volumes of the Asiatic Researches; and viewing the limited circulation of that work in continental libraries, they are inclined to believe that very few men of science have it in their power to form a correct judgment as to the value of Colonel Lambton's great work. The Committee therefore recommend that, when the verifications and corrections which they have particularized shall have been made, the whole be published in one volume, in a form as nearly similar as circumstances

permit to those describing Sir George Everest's operations and results, and in sufficient number (say 500 copies) to allow of their being presented to all the known Libraries, Academies, and Observatories of importance, throughout the world.

8. The Committee unhesitatingly express their opinion that the expense attending all the recommendations which they have made would be small in comparison with the scientific value of the result. And even in the event of ulterior operations (to which they proceed to allude) being ultimately sanctioned, the adoption of the course which they have recommended would give valuable facilities.

9. The Committee think it right, however, to call the attention of the President and Council to the general quality of Colonel Lambton's Surveys, which, though executed with the greatest care and ability, were carried on under serious difficulties, and at a time when instrumental appliances were far less complete than at present. There is no doubt that at the present time the Surveys admit of being improved in every part. The Standards of length are better ascertained than formerly, and all uncertainty on the unit of measure can be removed. The base-measuring apparatus can be improved. The instruments for horizontal angles used by Colonel Lambton were inferior to those now in use; and one of them was most severely injured by an accidental blow, the result of which was more distinctly injurious because the circle was read by only two microscopes. Allusion has already been made to the circumstances of observation affecting the altitude of stations. Though the astronomical observations were probably good for their age, yet new observations conducted with such instruments and on such principles as those adopted by Sir George Everest would undoubtedly be better. The Committee therefore express their strong hope that the whole of Colonel Lambton's Survey may be repeated with the best modern appliances. The expense of such a work would be considerable; but no Arc of Meridian yet measured has such claims on the attention of the patrons of science as the Indian Arc, from its proximately equatorial position, and from its anomalies and the reference of them to the attraction of the Himalaya Mountains.

“G. B. AIRY.

“W. H. MILLER.

“G. G. STOKES.”